

EXPERIMENT-2

TUNED AMPLIFIER

(Single Tuned Amplifier)

- I. Aim:** To design and plot the frequency response of a single tuned amplifier.
- II. Specification:** Operating Frequency of the Circuit = 10 kHz.
- III. Hardware:**
- Silicon-NPN-transistor BC107
 - Resistors: 18.3kΩ, 6.8kΩ, 1kΩ
 - Inductors: 3mH
 - Capacitors: 0.1μF, 10μF, 100μF
 - CRO
 - Function Generator
 - Bread board

IV. Theory:

About Tuned Amplifier:

Tuned Amplifiers are high frequency circuits designed to have a very narrow bandwidth and a voltage gain that peaks at a particular frequency. To produce these characteristics the amplifier uses a resonant parallel LC circuit (or tank circuit) as a BJT Collector load, this gives the amplifier a high voltage gain at the resonant frequency of the tank circuit.

V. Procedure:

- Connect the circuit as per the circuit diagram
- Apply 10mV pk with 52KHZ frequency using function generator{Software}
Apply 100mV p-p with 1KHz initially, slowly increase the frequency of Input Signal.
- Observe the output in CRO.
- Note output V_{p-p} and frequency for max Amplitude in Observation Table.
- Plot Frequency Response from Observations.

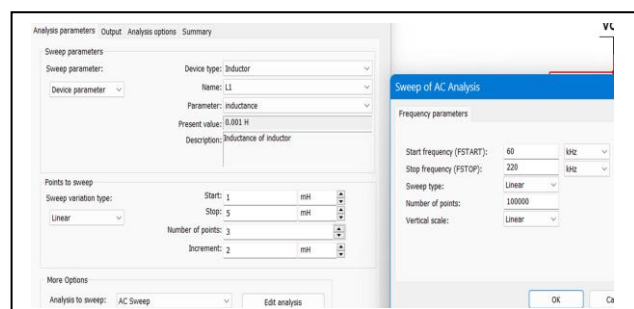
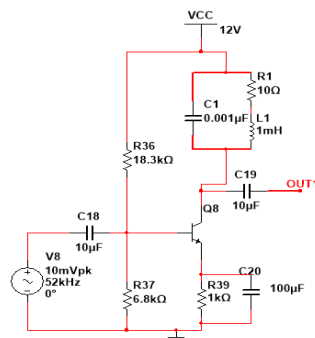
VI. Design:

$$F_c = \frac{1}{2\pi\sqrt{LC}}$$

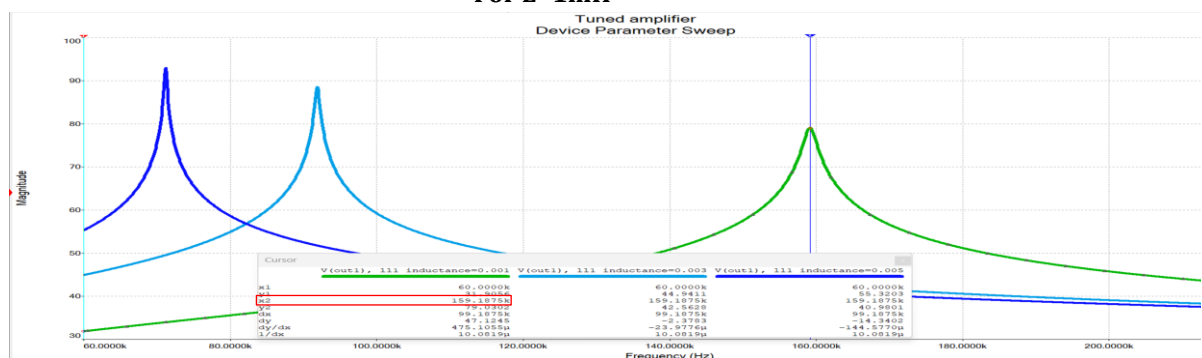
$$C = 0.1\mu\text{F}, L \sim 3\text{mH}, F_c = 10\text{KHz}$$

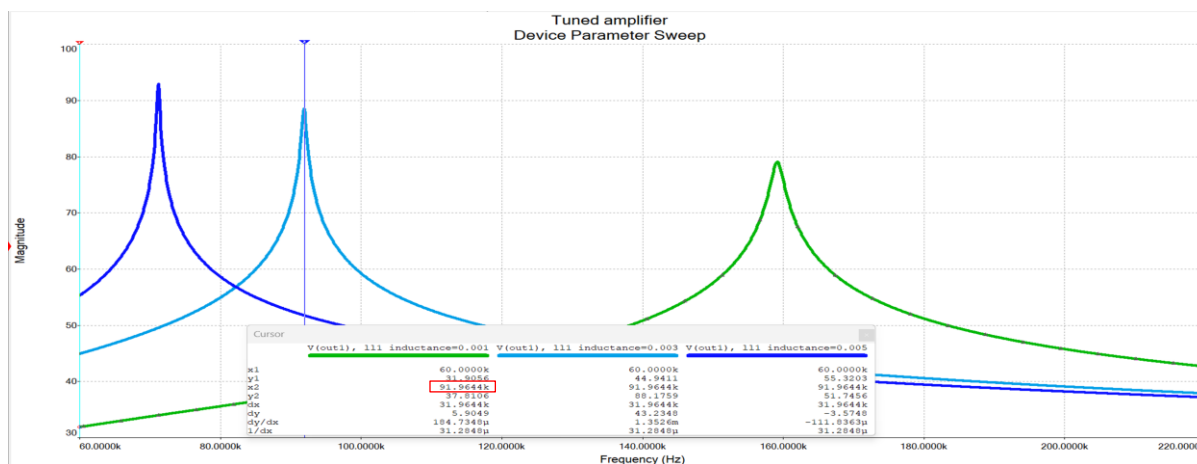
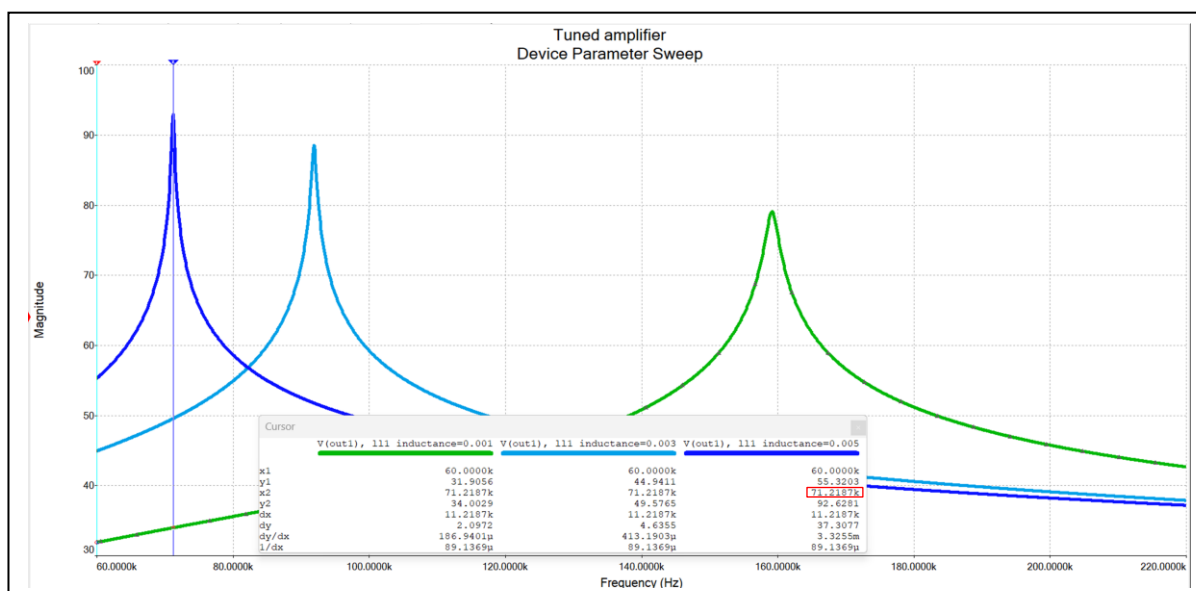
VII. Simulation Observations:

a. Single Tuned Amplifier:

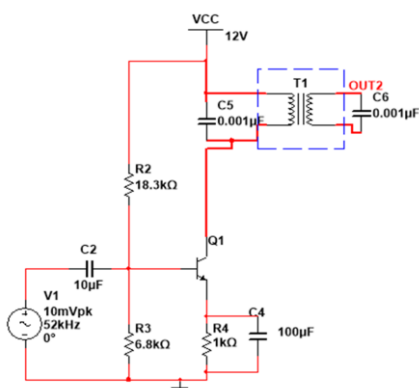


For L=1mH

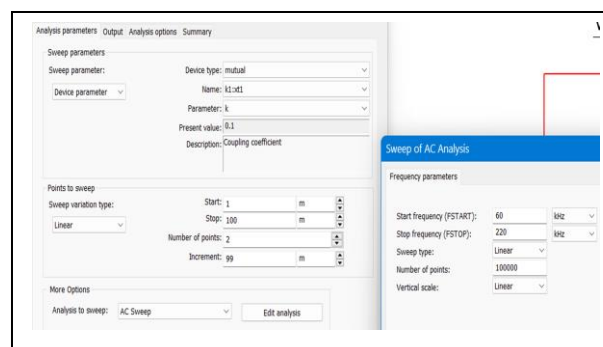


For L=3mH**For L=5mH**

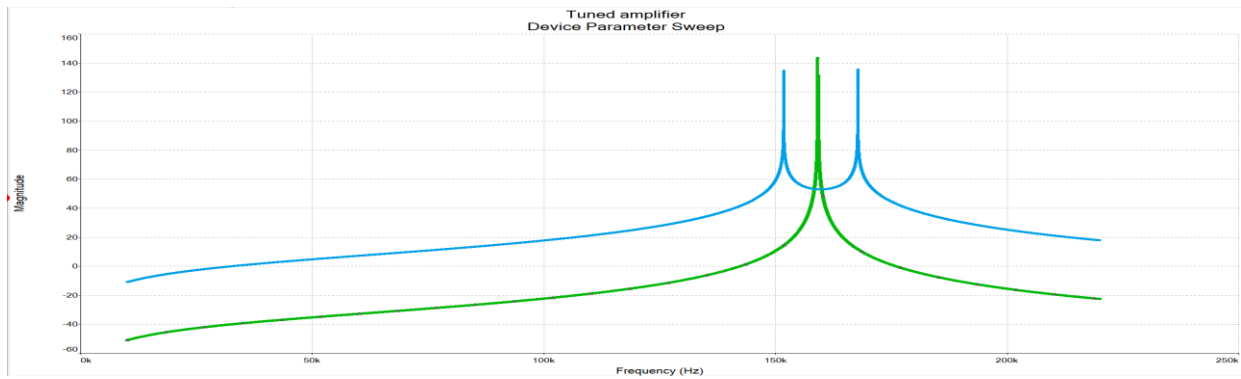
So from the above 3 cases we can observe that as Inductance increases the resonant frequency is decreasing and band becomes narrow which allows to operate our amplifier circuit at a particular frequency ,which provides max pull up resistance at that frequency allowing us to amplify the input signal at that frequency only. This Circuit Provides good selectivity of Frequency.

b. Double Tuned Amplifier:

$$\text{Bandwidth} = k \cdot f$$

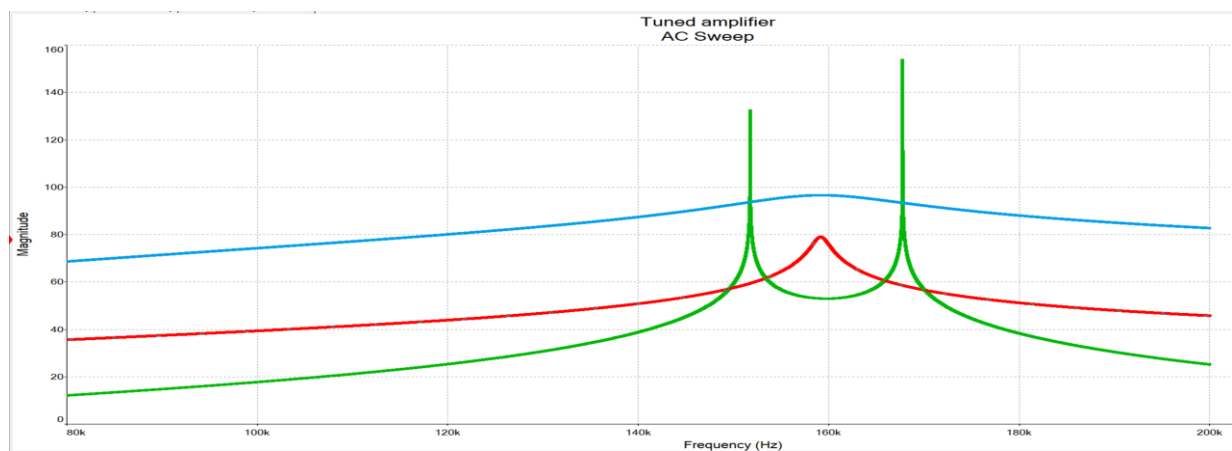
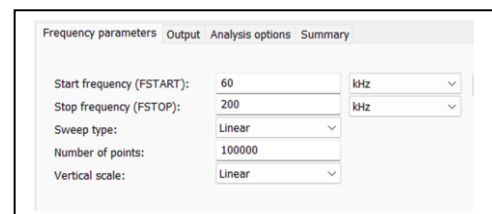
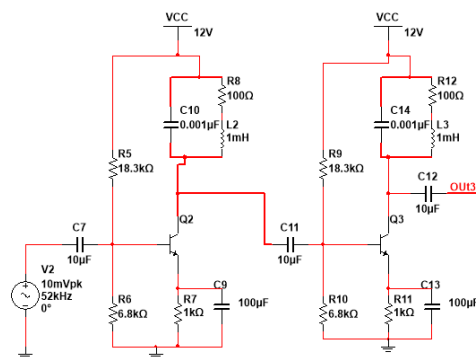


Where k = coefficient of coupling



It offers better selectivity and bandwidth when compared with single tuned amplifiers. As the value of coefficient of coupling increases, bandwidth increases.

c. Stagger Tuned Amplifier:



These staggered tuned amplifiers provide a wider bandwidth when compared with single tuned and staggered tuned amplifiers and hence this amplifier offers better selectivity.

Signature of the Faculty